

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

APRIL 2010 REPORT

Note to Readers: Pages 1-14 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 15.

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Item 1. The Chaos Caused by the Volcanic Eruption in Iceland Revealed Lack of a Global Framework to Deal with Large-Scale Air Traffic Disturbances

The total or partial closure of 313 European airports (75% of the European airport network) in the period April 15-21 due to the ash cloud following the eruption of Iceland's Eyjafjallajökull volcano affected over 100,000 flights, 10 million passengers, and loss of €2.5 billion (\$3.31 billion). The concurrent decision-making chaos exposed the lack of an adequate international framework and coordination strategy to deal with such large-scale disruptions (natural or manmade). The event might lead to new EU agreements such as the “Single European Sky” project, establishment of a single air network management solution, harmonization of all aviation-related national regulations, and eventually the creation of a global response strategy. The number and scale of air traffic disruptions could increase due to a combination of increasing travel and the larger scale of unexpected natural (and/or manmade) events as climate change continues.

Military Implications:

This is increased evidence that the military should continue planning, coordination, and training with counterparts around the world for assisting people's relocation and/or security in such large-scale disruptions (this time the UK used military ships to repatriate some of its stranded travelers).

Sources:

Europe scales down response to ash cloud

<http://euobserver.com/9/29892/?rk=1>

The impact of the volcanic ash cloud crisis on the air transport industry. Information Note to the Commission. SEC(2010) 533

http://ec.europa.eu/commission_2010-2014/kallas/headlines/news/2010/04/doc/information_note_volcano_crisis.pdf

Will Global Warming Make Iceland's Volcanoes Angry?

<http://news.discovery.com/earth/will-global-warming-make-icelands-volcanoes-angry.html>

Item 2. International Legal Frameworks Needed for Cybersecurity

After land, sea, air, and space, cyberspace became the “fifth battlespace” on the agenda of security experts. The next ‘Pearl Harbor’ is likely to be a cyberattack, says CIA director Leon Panetta. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. “A new legal and policy framework is needed for addressing cybersecurity challenges”, noted Lt. General Keith A. Alexander, nominee to head the Pentagon's new CyberCommand in testimony before the U.S. Congress, April 15, 2010. Some experts identify three levels of severity for cybersecurity: cybercrime, cyberespionage and reconnaissance, and cyber-leveraged war. There are documented massive cyberespionage schemes such as the one managed from China against several countries (including India and Pakistan). Additionally, electromagnetic pulses could be used for destroying critical infrastructure (see item *International Standards Needed to Reduce Hi-tech SIMAD Threats* in May 2009 environmental security report.)

Efforts to improve managing cyber-leveraged war, so that damage is contained and reduced, include NATO's recent gathering of top cyber-minds to address the evolution of conflict in an Internet-dependent world, and National Security Agency and other cyber security experts' participation in the Cyber Defense Exercise (CDX) hosted by Lockheed Martin - Greenbelt (for

the eighth year). The European Commission will conduct a feasibility study for creating a body that would assess trends in cybercrime across the EU and facilitate harmonization of related legislation among the different legal systems of the 27 EU countries (while the EU states have yet to ratify the Convention on Cybercrime adopted in 2001). In the meantime, there are proposals to include in the WEEE directive (for waste electrical and electronic equipment) provisions to facilitate protection of data stored on discarded devices.

Military Implications:

Electromagnetic pulse attacks on cyberspace could be a major weapon of state and non-state actors affecting the micro through macro infrastructure of the internet, hard drives, power controls, banking, communications, etc. The military should increase its efforts to raise the profile of these issues to improve global cybersecurity strategy, and design for international legal frameworks, norms, and standards with enforcement measures.

Sources: (see an expanded list in the [Appendix](#))

NATO's cyber-brains gaze at the future of war

http://www.spacewar.com/reports/NATOs_cyber-brains_gaze_at_the_future_of_war_999.html

Shadows in the Cloud: An investigation into cyber espionage 2.0

<http://www.infowar-monitor.net/2010/04/shadows-in-the-cloud-an-investigation-into-cyber-espionage-2-0-2/>

LockMart Supports National Security Agency's 2010 Cyber Defense Exercise

http://www.spacewar.com/reports/LockMart_Supports_National_Security_Agency_2010_Cyber_Defense_Exercise_999.html

EU to set up anti-cybercrime body

<http://euobserver.com/9/29946/?rk=1>

Item 3. Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research

The Argo Project is an array of 3,255 (as of March 23, 2010) free-floating seawater quality monitoring devices supported by 46 nations. It operates in the framework of WMO (World Meteorological Organization) Integrated Global Observing Systems since 2007, and contributes to the Global Earth Observation System of Systems (GEOSS) with Guidelines adopted in June 2008. There are controversies over information collection systems and sometimes violations of exclusive economic zones. The results of these controversies might determine the evolution of the debate among scientists and diplomats over freedom of conducting oceanic research.

Deploying new technologies on the high seas is sometimes seen as conflicting with regulations protecting coastal states' sovereign rights. The 43rd session of the Intergovernmental Oceanographic Commission Executive Council meeting in June is expected to address issues of relevance to the "soft-law guidelines or codes of conduct" and the legal regulations affecting the scientific work of several environmental early warning systems.

Military Implications:

Since scientific research related to environmental early warning and conditions is intrinsic to security, the military should liaise with those developing international frameworks for regulating research instruments deployed on the high seas and be alert to potential sovereignty issues that might arise from the deployment of its own monitoring devices.

Sources:

Climate Change and Guidelines for Argo Profiling Float Deployment on the High Seas

<http://www.asil.org/insights100408.cfm>

IOC/EC-XLIII 43rd Session of IOC Executive Council, 8 - 16 June 2010, Paris, France

http://www.ioc-unesco.org/index.php?option=com_oa&task=viewEventRecord&eventID=521

Item 4. Draft International Standards for Measuring Greenhouse Gas Emissions for Cities

The Draft International Standard for Determining Greenhouse Gas Emissions for Cities is setting a common framework for calculating the emission amounts of greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The computation is done on a per capita basis, allowing comparison and analysis among cities. Measurements are now completed for more than 40 cities, with the aim of completing it for all world cities. The Draft was launched by UNEP, UN-HABITAT, and the World Bank. It is now open for public comment.

Military Implications:

Military organizations need to be aware of and familiar with the recent Executive Order 13514 and the CEQ-OMB Strategic Sustainability Performance Plan. The military among other federal agencies will be given instructions on calculating GHGs as part of their respective yearly reporting on progress in adhering to this EO. These directives should guide any discussions with international organizations and foreign governments regarding GHG reporting.

Sources:

Cities Get Common Standard for Measuring Greenhouse Gas Emissions

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6508&l=en&t=long>

Draft International Standard for Determining Greenhouse Gas Emissions for Cities

http://www.unep.org/urban_environment/PDFs/InternationalStd-GHG.pdf

UN-HABITAT Annual Report

<http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2938>

Executive Order 13514—Federal Leadership in Environmental, Energy, and Economic Performance

<http://edocket.access.gpo.gov/2009/pdf/E9-24518.pdf>

Item 5. Environmental Courts and Tribunals Are Rapidly Increasing Around the World

According to an international study by the World Resources Institute (WRI), there are about 350 environmental courts in 41 countries. About half of them were created over the last five years, increasing public access to environment-specialized legal systems. The increasing number of courts dedicated to environmental issues should lead to accelerated changes in environmental lawsuits, creating precedents around the world. It reinforces the trends toward improved enforcement and applications of the “polluter pays” principle.

Military Implications:

The military may require additional environmental legal staff to monitor implications for military actions and increased training for those responsible for anticipating and responding to environmental regulations.

Sources:

Environmental Courts Becoming More Popular Worldwide, but Steps Needed for Improvement
<http://www.wri.org/press/2010/04/news-release-environmental-courts-becoming-more-popular-worldwide-steps-needed-improve>

Creating and Improving Environmental Courts and Tribunals
<http://www.accessinitiative.org/resource/greening-justice>

Item 6. Morocco Adopts First National Earth Charter in the Arab World and Africa

The National Charter for Environment and Sustainable Development adopted by the Kingdom of Morocco represents the first such commitment in Africa and the Arab World. The Charter sets a framework for future regulations for natural resources, the environment, and sustainability policy. It was launched at the celebration of Earth Day's 40th anniversary, April 22, 2010.

Military Implications:

AFRICOM and military units stationed in Africa and the Arab World should encourage emulation of Morocco's example as part of promoting conflict resolution policies.

Sources:

Morocco's National Earth Charter a First for the Arab World
<http://www.ens-newswire.com/ens/apr2010/2010-04-22-01.html>

Morocco Announces National Earth Charter for 40th Anniversary of Earth Day
<http://earthday.net/blog/2010/03/19/morocco-announces-national-earth-charter-for-40th-anniversary-of-earth-day/>

Item 7. Technological Advances with Environmental Security Implications

7.1. Increasing Energy Efficiency and Green Technologies

7.1.1 Genetically Modified Virus Claimed to Separate Hydrogen from Water

Scientists at MIT have used a genetically modified virus to split water molecules into hydrogen and oxygen, similar to photosynthesis.

Military Implications:

The military should follow the evolution of this technology as a new possibility for cost-effective hydrogen powered generation.

Sources:

MIT researchers harness viruses to split water
<http://web.mit.edu/press/2010/virus-water.html>

MIT Trains Viruses to Split Water, Make Stored Solar Power
<http://www.dailytech.com/MIT+Trains+Viruses+to+Split+Water+Make+Stored+Solar+Power/article18119.htm>

7.1.2 Fiber Bundles Claimed Safe for Hydrogen Storage and Cuts Costs and Weight

Israeli scientists working for C. En Ltd. in Geneva claim that their new hydrogen-filled capillary fiber bundles provide safe storage of hydrogen for less than half the space and weight of tanks installed in existing hydrogen cars. A unit containing 4 million of the hair-thin capillaries will store enough gas for 400 km of auto travel, according to the researchers.

Military Implications:

The military should follow this development on its path toward commercialization, as a useful component of hydrogen vehicles and fuel cell energy systems.

Sources:

Hydrogen still in the eco-car race

<http://www.physorg.com/news190778451.html>

C.En Company

<http://www.cenh2go.com/>

7.1.3 Fiber-based Solar Cells Decrease Cost and Double Output

Wake Forest University's Center for Nanotechnology and Molecular Materials has announced a new technology that inexpensively produces solar cells with double the power output of other designs. The cells are based on microscopic plastic optical fibers, enhanced with red dye or other absorbent. This raises the prospect of shipping the untreated cells to less developed areas for finishing with dye from pokeberries, which thrive under sub-optimal conditions, and where costs for such a processing facility would be low. The technology has been licensed to FiberCell Inc. in Winston-Salem NC.

Military Implications:

The military should follow the commercialization of this technology for possible use in alternative energy systems.

Sources:

A brighter idea. Wake Forest receives patent for new fiber solar cells

<http://www.wfu.edu/wowf/2010/20100407.solar.php>

Red dye from pokeberries holds secret to affordable solar power

<http://www.nanowerk.com/news/newsid=15962.php>

7.1.4 New Materials May Be Solar Cell Breakthrough

Two technologies developed by Prof. Benoît Marsan and colleagues at the Chemistry Dept. of the Université du Québec à Montréal may allow commercialization of the Grätzel dye-synthesized solar cell, a promising design based on the principle of photosynthesis, but whose application has been blocked by having a corrosive, opaque electrolyte and an expensive platinum electrode. Prof. Marsan's variant uses a newly formulated transparent and neutral electrolyte and an electrode coated with relatively inexpensive cobalt sulphide.

Military Implications:

The military should follow this development as a contribution to the progress toward more efficient alternative energy generation systems.

Sources:

Researchers solve two 20-year old problems that could transform solar cell technology

http://www.nanowerk.com/news/newsid=15659.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

CoS Supersedes Pt as Efficient Electrocatalyst for Triiodide Reduction in Dye-Sensitized Solar Cells

<http://pubs.acs.org/doi/abs/10.1021/ja905970y>

An organic redox electrolyte to rival triiodide/iodide in dye-sensitized solar cells

<http://www.nature.com/nchem/journal/v2/n5/abs/nchem.610.html>

7.2 Landslide-Predicting Sensors to Be Developed

Dr. Kirk Martinez, from Southampton University's School of Electronics and Computer Science, and Prof. Jane Hart, of the School of Geography, are continuing to develop fist-sized sensors that will monitor such soil parameters as light, conductivity, tilt, temperature, and movement, and transmit the data by radio, enabling the prediction of imminent landslides.

Military Implications:

The military should follow this development for its applicability in systems for the protection of military installations and equipment from landslides.

Source:

New sensors to predict landslides

http://www.soton.ac.uk/mediacentre/news/2010/apr/10_40.shtml

7.3 Plastic Waste Yields Porous Paving for Walks and Drives

Civil and Environmental Engineering Prof. Naji Khoury of Temple Univ. has developed a technique for turning plastic bottle waste and coarse aggregate into a cement-like material, Plastisoil™, that he says is both cheaper and more energy-sparing than concrete or asphalt and that also has the advantage of being porous, so that rainwater drains through it. It also, of course, disposes of plastic bottles (30,000 per ton).

Military Implications:

The military should investigate this product, when it becomes commercially available, for possible use in military recycling and construction programs.

Source:

Cement-like creation could help the environment

<http://www.physorg.com/news190999420.html>

7.4 Nanoporous Alumina Membranes Useful for EHS Applications

A paper with senior author Dr. Roger Narayan, of the Joint Department of Biomedical Engineering, Univ. of North Carolina and NC State University, reports the use of atomic layer deposition onto nanoporous alumina membranes to produce a material for use in a variety of medical and environmental health applications; e.g., water purification using a zinc-oxide-coated membrane able to neutralize E. coli and Staphylococcus aureus.

Military Implications:

The military should follow up on the possible use of this technology for environmental remediation and preventive health functions.

Sources:

Incorporating biofunctionality into nanomaterials for medical, health devices

<http://www.nanowerk.com/news/newsid=15441.php>

Atomic layer deposition-based functionalization of materials for medical and environmental health applications

<http://rsta.royalsocietypublishing.org/content/368/1917/2033>

Item 8. Updates on Previously Identified Issues

8.1 Advancements on Denuclearization

The new Strategic Arms Reduction Treaty (START) signed by the U.S. and Russia (together holding more than 90% of the world's nuclear weapons) requires each to reduce their strategic nuclear arsenal to 1,550 deployed warheads (from the present 2,200-weapon limit) and to 800 launchers within seven years. The Treaty will enter into force after being approved by the two countries' legislatures. Critics note that the treaty doesn't address the disposal of the nuclear material contained in the weapons. Also, the newly released U.S. Nuclear Posture Review aims to reduce the role of nuclear weapons in the U.S. national security strategy. A two-day nuclear security summit held in Washington DC, gathering leaders of 47 nations, addressed measures to secure vulnerable nuclear materials by 2014 and avoid nuclear terrorism.

Egypt plans to increase pressure for beginning negotiations before 2012 for establishing a nuclear weapon-free Middle East. The Malaysian Strategic Trade Bill vigorously enforces legislation concerning illicit trafficking of WMD materials or technology. Meanwhile, in India, the proposed law limiting the liability to foreign nuclear power companies in the event of an accident triggers worries over potential lax safety standards and nuclear disaster. [Related item: *Australia to Propose Panel to Advance Work for the NPT Review in 2010* in June 2008 and other similar items in previous environmental security reports.]

Military Implications:

The military should explore these and other initiatives as options to advance nuclear disarmament and facilitate NPT negotiations and improve global nuclear safety.

Sources: (an expanded list in the [Appendix](#))

New Strategic Arms Reduction Treaty (New START)

<http://www.state.gov/t/vci/trty/126118.htm>

Nuclear Posture Review

<http://www.defense.gov/npr/>

Nuke-Free Middle East Needed to Resolve Iran Dispute, Egypt Asserts

http://gsn.nti.org/gsn/nw_20100428_9811.php

Malaysia Pledges to Carry Out WMD Smuggling Penalties

http://gsn.nti.org/gsn/nw_20100415_4276.php

Controversial Indian law on nuclear liability spells disaster – activists

http://www.alertnet.org/db/an_art/55867/2010/03/14-111827-1.htm

8.2 New Measures for Protecting the Marine Environment

The UK government has created the world's largest marine reserve (545,000 sq km) around the Chagos Islands, regarded as one of the world's richest marine ecosystems.

The sixth session of the Conference of the Parties (COP) to the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean adopted a 25-year program of action for efficient management of the marine and coastal environment in the larger Eastern and Southern African region, as well as a Protocol to the Convention considering new emerging issues, such as climate change and the need for an ecosystem-based management approach. [Related item: *New Measure to Enforce Maritime Environmental Protection* in March 2010 environmental security report.]

Military Implications:

Military components in the areas should take note of these measures and the way they might affect military operations (e.g., at Diego Garcia.)

Sources:

UK sets up Chagos Islands marine reserve

<http://news.bbc.co.uk/2/hi/science/nature/8599125.stm>

Ministers Launch Rejuvenated Nairobi Convention to Protect the Western Indian Ocean's Environment

<http://www.unep.org/environmentalgovernance/News/Press-Release/tabid/427/language/en-US/Default.aspx?DocumentID=620&ArticleID=6521&Lang=en>

8.3 Genetic Patenting and GMO Face New Challenges

A National Research Council study on the impacts of GM crops on economic and environmental security found that at least nine species of weeds in the U.S. have developed resistance to glyphosate since the introduction of GM crops in 1996. Glyphosate is a major component in commercial herbicides and GM crops are designed to tolerate it. Insufficiently diverse farming practices and excessive reliance on a single technology could undermine the economic and environmental benefits of GMOs use. In the U.S., GM crops account for more than 80% of soybeans, corn, and cotton.

The first U.S. federal ruling declaring patents on genes invalid concerns the BRCA 1 and 2 genes (related to breast and ovarian cancers), and was made on the grounds that it is “a valuable scientific achievement ... but ...not ...something for which they are entitled to a patent”. Approximately 2,000 human genes (20% of the human genome) are currently covered by patents, including those associated with certain degenerative disorders and cancers. The ruling may have broad implications for the validity of gene patents in general, including patents on GMOs. [Related item: *International Biodiversity Meetings Make Decisions and Tougher Systems to Control GMO Suggested* in March 2006 environmental security report.]

Military implications:

The military should be prepared to deal with new situations triggered by controversial GMO patenting practices or restriction, such as implications for economic development and international relations, as well as potential illicit trafficking of patents or GMO products.

Sources:

Gene Patents Ruled Invalid

<http://www.technologyreview.com/blog/editors/24986/>

Impact of Genetically Engineered Crops on Farm Sustainability in the United States

http://www.nap.edu/catalog.php?record_id=12804

8.4 India Further Loosens Already Lax Rules on Waste Importing

Illegal waste shipping to India might worsen due to new amendments made by the Ministry of Environment and Forests to the Hazardous Wastes Rules. While previous rules allowed only ‘recyclers’ to bring in certain waste, the new amendments will also allow ‘traders’ to do so, making control and enforcement potentially more difficult. This could be an additional factor increasing India’s pollution; threatening its already precarious environment, health conditions, and falling water tables. [Related items: *Hazardous Waste Disposal of Increasing Concern* in September 2009 and other previous environmental security reports.]

Military Implications:

Potential new hazardous waste loads could reduce environmental viability for life support, increasing the likelihood of conflicts. Future military-to-military programs might include means to monitor such new potential pollution impacts.

Sources:

Is India a global trash can?

<http://timesofindia.indiatimes.com/india/Is-India-a-global-trash-can-/articleshow/5851954.cms>

Got hazardous waste? Send it to India

<http://www.livemint.com/2010/04/25233450/Got-hazardous-waste-Send-it-t.html>

8.5 Russia and Norway Agree on Maritime Delimitation of Disputed Arctic Territory

Norway and Russia reached agreement over the borders and use of a disputed territory of 175,000 square kilometers (108,740 sq miles) of Arctic shelf, concluding some 40 years of negotiations. The joint declaration signed on April 27, 2010 stipulates the maritime delimitation lines and creates cooperation opportunities for exploitation of the area's rich natural resources. Some further technical details need to be worked out until the final treaty, which then will need to be ratified by the two countries' parliaments. The agreement might also represent an important step forward in the multilateral negotiations concerning the Arctic territories. [Related items: *Arctic Debates Continue* in March 2010 and other items on this issue in previous environmental security reports.]

Military Implications:

[Same as previous on this issue] Military-to-military collaboration should increase among all the Arctic countries to support friendly political and economic negotiations and to assure security in the increasingly vulnerable region.

Sources:

Russia-Norway pact defuses Arctic tension

<http://euobserver.com/9/29958/?rk=1>

Norway, Russia Strike Deal to Divide Arctic Undersea Territory

<http://www.themoscowtimes.com/business/article/norway-russia-strike-deal-to-divide-arctic-undersea-territory/404939.html>

8.6 Climate Change**8.6.1 Scientific Evidence and Natural Disasters**

In March 2010, the combined global land and ocean surface temperature was the highest since record keeping began in 1880, according to NOAA and confirmed by NASA. NOAA found the combined global land and ocean average surface temperature 1.39°F (0.77°C) above the 20th century average, while NASA found the March combined average global land-surface air temperature a record 1.9°F (1.05°C) above the 20th century average.

Climate change and man-made CO₂ emissions are changing ocean chemistry and marine ecosystems, reveal new studies. *Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean* by the National Research Council, warns that the level of ocean acidity is increasing at an unprecedented rate and since the ocean absorbs approximately a third of CO₂ emissions, unless man-made CO₂ emissions are substantially curbed or controlled by technological means, the ocean will continue to become more acidic. Meantime, global warming

is changing oceans salinity, making some regions saltier, while other are getting fresher, according to research conducted by the Australian government's research agency CSIRO Wealth from Oceans Flagship using data gathered by the global network of 3,200 Argo buoys.

8.6.2 Food and Water Security

"Arab countries do not disclose enough information on their water out of concern that transparency could fuel unnecessary public concern and unrest," noted Hosny Khordagui, Regional Program Director of the UNDP Water Governance Programme for Arab States <http://www.alertnet.org/thenews/newsdesk/LDE6300FO.htm>. According to the UNDP's Arab Human Development Report, people in the Middle East and North Africa have access to an average of only 1,000 cubic meters of water a year, one-seventh the worldwide rate, which by 2025 might be further reduced to 460 cubic meters due to high population growth and the effects of climate change. Arable land is also expected to shrink due to climate change, further jeopardizing poor farmers' livelihood and pushing people to move to overcrowded cities.

The worst drought in at least 50 years in southern China left tens of millions of people short of water and fuels disputes with countries that share the Mekong River, especially Thailand, over the role of Chinese dams in decreasing river flows. Some argue that more dams in China could help mitigate the Mekong's seasonal variations by storing or releasing water as necessary.

8.6.3 Health

To celebrate World Health Day on April 7th, WHO and the Commonwealth Secretariat released publications that underline the linkages between urban health and climate change. "Why Urban Health Matters" notes that urban areas concentrate both emitters of greenhouse gases and people at risk from climate change impacts such as heat waves, water scarcity, increasing levels of air pollution, or rising sea levels. A discussion paper by the Commonwealth Secretariat, "The State of the Cities: Why, and how, the Commonwealth must address the challenge of sustainable urbanization", stresses that climate change and slum-based poverty are exacerbated by today's urban growth.

8.6.4 Melting Glaciers

Andean glaciers in Latin America lost more than 40% of their surface area between 1956 and 2006, according to a study to be published by Ecuadorean glaciologist Bolivar Cáceres.

In Europe, almost 90% of Austrian glaciers shrank in 2009, some by as much as 46 meters (150 feet), reports the Austrian Alpine Association.

8.6.5 Migration

WFP Executive Director Josette Sheeran announced that WFP will step up its support to address the intense droughts in Niger, which are escalating the humanitarian crisis and are contributing to mass migration from rural to urban areas as well as to neighboring countries. In Southern Niger, the food crisis is estimated to be affecting 7.8 million people.

The flooding and landslides in Rio de Janeiro, Brazil, killed over 200 people and greatly affected the impoverished communities. In response, authorities ordered the eviction of thousands of poor people from the favelas, despite their opposition and threats of revolt.

8.6.6 Adaptation

At the UN International Strategy for Disaster Reduction (UN/ISDR) Second Ministerial Conference on Disaster Risk Reduction (DRR), held April 14-16, 2010, in Nairobi, Kenya, African Ministers adopted the Programme of Action for the Implementation of the Africa Regional Strategy for Disaster Risk Reduction (2006–2015) and a Ministerial Declaration. The Programme aims to mainstream risk reduction management and climate change adaptation as an integral part of sustainable development. The Ministerial Declaration calls on the AU Summit to make disaster risk reduction and adaptation to climate change a national education priority through integration into the educational system. The 2010 Economic Report on Africa, “Promoting High-level Sustainable Growth to Reduce Unemployment in Africa” warns that conflicts in the region will probably increase due to diminishing resources, and emphasizes the need for Africa to develop adaptation and mitigation strategies. Noting that the costs of adaptation and mitigation are beyond the means of African countries, the report calls on the international community to increase help for financing these strategies.

At the 16th summit of the Association of Southeast Asian Nations (ASEAN), held April 8-9, 2010, in Hanoi, Viet Nam, under the theme “Towards the ASEAN Community: from vision to action”, the leaders released a joint statement calling for a legally binding global pact on climate change and urged richer nations to provide them with ‘scaled-up’ financial help to combat climate change. The development of an ASEAN action plan to better understand and respond to climate change is also considered.

8.6.7 Post-Copenhagen Negotiations

The first round of UN climate change negotiations since the Copenhagen conference was held in Bonn, April 9-11, 2010, with the main objective to agree on the organization and methods of work for 2010. More than 1,700 delegates attended from 175 countries. In order to advance the negotiations towards a treaty in Mexico, it was decided that, in addition to the negotiating sessions already scheduled for 2010, two additional meetings would be held of at least one week each, to take place between the 32nd session of the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) Convention subsidiary bodies—May 31-June 11, 2010, and the UN Climate Change Conference in Mexico—November 29-December 10, 2010.

In an effort to get developing countries on board for an international global warming deal, the U.S. State Department announced that countries opposing the Copenhagen accord will be denied climate change assistance from the promised \$30 billion climate aid fund.

Military Implications:

[Same as previous on this issue] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (see a more expanded list in the [Appendix](#))

Global Temperatures Last Month Broke Heat Records for March

<http://www.ens-newswire.com/ens/apr2010/2010-04-16-01.html>

CO₂ Emissions Causing Ocean Acidification to Progress at Unprecedented Rate
<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12904>

Oceans' Saltiness Reaching Extremes

<http://news.discovery.com/earth/oceans-saltier-salinity-warming.html>

Arab states urged to be open on water scarcity

<http://www.alertnet.org/thenews/newsdesk/LDE6300FO.htm>

Countries Blame China, Not Nature, for Water Shortage

<http://www.nytimes.com/2010/04/02/world/asia/02drought.html?ref=world>

World Health Day Website

<http://www.who.int/world-health-day/2010/en/index.html>

Why Urban Health Matters

<http://www.who.int/world-health-day/2010/media/whd2010background.pdf>

The State of the Cities

http://www.thecommonwealth.org/document/222182/the_state_of_the_cities.htm

Scientists investigate Ecuador's receding glaciers

<http://news.bbc.co.uk/2/hi/americas/8629527.stm>

WFP Steps Up Response to Growing Food Crisis in Niger

<http://www.wfp.org/news/news-release/wfp-steps-response-growing-food-crisis-niger>

Rio slum dwellers face forced eviction after landslides

<http://www.guardian.co.uk/world/2010/apr/11/rio-brazil-slum-forced-evictions>

African ministers adopt the extended Programme of Action

<http://www.unisdr.org/news/v.php?id=13655>

16th ASEAN Summit Website

http://asean2010.vn/asean_en/news/46

UNFCCC Parties Agree on Additional Meeting Sessions Before COP 16

<http://climate-1.org/2010/04/12/unfccc-parties-agree-on-additional-meeting-sessions-before-cop-16/>

US denies climate aid to countries opposing Copenhagen accord

<http://www.guardian.co.uk/environment/2010/apr/09/us-climate-aid>

8.7 Global Climate Change Situation Room in Gimcheon, South Korea

The initial set of Bata collective intelligence software for the Global Climate Change Situation Room is planned to be installed in Gimcheon, South Korea during the last week in June. Initial staff training was conducted this month. International expert discussion groups are being established on climate science, energy, green technology, and policy integration to feed information to and be fed questions from the Situation Room. The Bata software development platform is available for viewing at <http://www.new.webserver9.com/manage/node>. Updates and improvements are ongoing. [Related item: *Gimcheon, South Korea to Create a Global Climate Change Situation Room* in August 2009 environmental security report]

Military Implications:

Those personnel interested in joining expert discussion groups should contact jglenn@igc.org indicating what group(s) they want to join and a brief resume. The portal for the Situation Room can be accessed without being a member of a group. This could be a resource for those responsible for developing military environmental policy and technology. It can also be a channel to share military success on climate change mitigation and adaptation programs and technologies.

Source:

Global Climate Change Situation Room – Bata software development platform

<http://www.new.websserver9.com/manage/node>

8.8 Nanotechnology Safety Issues

More detailed descriptions of the following nanotechnology issues are in the [Appendix](#)

- Health Canada seeks comments on an interim policy statement that establishes a working definition for nanomaterials ([more](#))
- Sri Lanka Institute of Nanotechnology (SLINTEC) launched the first Sri Lankan information portal for nanotechnology ([more](#))
- German FramingNano Workshop--presentations on regulatory developments ([more](#))
- Conference on the Global Regulation of Nanotechnologies to be held May 7-8, 2010 ([more](#))

Item 9. Reports and Information Suggested for Review**9.1 World Bank Development Indicators Database Available Free**

The World Bank has made freely available online < <http://data.worldbank.org/> > its databases of more than 2,000 indicators from countries around the world, many with historical data for 50 years. This includes a large section on the environment.

Military Implications:

The military should consider creating a World Environmental Security State of the Future Index using relevant World Bank data. Such an integrated ten-year index could be used as a policy tool to identify which variables - if changed - have the greatest impact on the overall environmental security of the world.

Source:

WDI <http://data.worldbank.org/>

9.2 Report Suggests New Approach to Technology Assessment

Reinventing Technology Assessment: A 21st Century Model, a report by the Woodrow Wilson International Center for Scholars, looks at closing the gap between the rhetoric of “engaging the public” in S&T debate and practice. It provides a comprehensive overview of participatory technology assessment (pTA) and applications in the EU and U.S., and recommends creation of “an institutional network that can integrate public engagement into future technology assessment activities.”

Military Implications:

Military personnel concerned with the assessment of new environment-related technologies, and technology in general, should review this report for its ideas on improving the process.

Source:

Reinventing Technology Assessment: A 21st Century Model

http://www.wilsoncenter.org/index.cfm?topic_id=1414&fuseaction=topics.event_summary&event_id=605820

9.3 Reports addressing the Link between Climate Change and Conflict

'Human Securitising' the Climate Security Debate, by Lorraine Elliott, is a working paper of the Asia Security Initiative Policy Series. It assesses the connection between climate change and national, regional and international security from a human security point of view. The recommendations basically advocate pro-active rather than reactive strategies based on vulnerability vs. risk and adaptation and social resilience vs. mitigation. In order to avoid conflict, scarce resource management should include equity provisions regarding those most vulnerable to environmental scarcities.

Climate Conflict: How Global Warming Threatens Security and What to Do about it, by Jeffrey Mazo from the IISS Environmental Security and Science Policy, provides a view of how climate changes affects security from a historical perspective. It points out that the most vulnerable countries are not necessarily the fragile states or those most affected physically by the effects of climate change, but those that fail to overcome cultural, social, political, and economic barriers to successful adaptation to a changing climate.

Military Implications:

The military might consider the reports for input to addressing environment-related conflict issues.

Sources:

'Human Securitising' the Climate Security Debate

http://www.rsis.edu.sg/NTS/resources/research_papers/MacArthur_working_paper_Lorraine%20Elliott.pdf

Climate Conflict: how global warming threatens security and what to do about it - Launch

<http://www.iiss.org/whats-new/iiss-podcasts/adelphi-webcasts/climate-conflict/>

Climate conflict: how global warming threatens security and what to do about it

<http://sustainablesecurity.org/article/climate-conflict-how-global-warming-threatens-security-and-what-do-about-it>

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 2. International Legal Frameworks Needed for Cybersecurity

Sources: (a more expanded list)

CIA Director tells Cap-to-Cap delegates: Cyber attack could be next “Pearl

Harbor” <http://www.metrochamber.org/CWT/External/WCPages/WCNews/NewsArticleDisplay.aspx?ArticleID=675>

Harknett, Richard J.; Callaghan, John P.; and Kauffman, Rudi (2010) "Leaving Deterrence Behind: War-Fighting and National Cybersecurity," *Journal of Homeland Security and Emergency Management*: Vol. 7 : Iss. 1, Article 22. DOI:

10.2202/1547-7355.1636, <http://www.bepress.com/jhsem/vol7/iss1/22>

“Shadows in the Cloud: An investigation into cyber espionage 2.0” The Information Warfare Monitor and the Shadowserver Foundation, 2010 <http://shadows-in-the-cloud.net/>

NATO's cyber-brains gaze at the future of war

http://www.spacewar.com/reports/NATOs_cyber-brains_gaze_at_the_future_of_war_999.html

US Needs New National Strategy In Era Of Cyberaggression

http://www.spacedaily.com/reports/US_Needs_New_National_Strategy_In_Era_Of_Cyberaggression_999.html

CIA Director tells Cap-to-Cap delegates: Cyber attack could be next “Pearl

Harbor” <http://www.metrochamber.org/CWT/External/WCPages/WCNews/NewsArticleDisplay.aspx?ArticleID=675>

Harknett, Richard J.; Callaghan, John P.; and Kauffman, Rudi (2010) "Leaving Deterrence Behind: War-Fighting and National Cybersecurity," *Journal of Homeland Security and Emergency Management*: Vol. 7 : Iss. 1, Article 22. DOI: 10.2202/1547-7355.1636

<http://www.bepress.com/jhsem/vol7/iss1/22>

The Dark side of Cyberspace. Cyber Espionage Campaign Uncovered by Canadian Shadow Warriors

http://defense-update.com/features/2010/april/dark_side_of_cyberspace_14042010.html#more

Shadows in the Cloud: An investigation into cyber espionage 2.0

<http://www.infowar-monitor.net/2010/04/shadows-in-the-cloud-an-investigation-into-cyber-espionage-2-0-2/>

Researchers Trace Data Theft to Intruders in China

<http://www.nytimes.com/2010/04/06/science/06cyber.htm>

LockMart Supports National Security Agency's 2010 Cyber Defense Exercise

http://www.spacewar.com/reports/LockMart_Supports_National_Security_Agency_2010_Cyber_Defense_Exercise_999.html

EU to set up anti-cybercrime body

<http://euobserver.com/9/29946/?rk=1>

Russian Hackers Threaten the World

http://english.pravda.ru/business/companies/28-04-2010/113197-cyber_threat-0

Data left on old computers a boon for scam artists, warns EU data supervisor

<http://euobserver.com/9/29873/?rk=1>

Item 8. Updates on Previously Identified Issues

8.1 Advancements on Denuclearization

Sources: (a more expanded list)

World Leaders Meet to Prevent Nuclear Terrorism

<http://www.ens-newswire.com/ens/apr2010/2010-04-12-03.html>

'Safer Environment' to Emerge from New START Treaty

<http://www.ens-newswire.com/ens/apr2010/2010-04-08-03.html>

New Strategic Arms Reduction Treaty (New START)

<http://www.state.gov/t/vci/trty/126118.htm>

Nuclear Posture Review

<http://www.defense.gov/npr/>

Obama Curbs U.S. Nuclear Weapons Development, Usage Policy

http://gsn.nti.org/gsn/nw_20100406_4937.php

Egypt to Demand Talks on Nuke-Free Middle East

http://gsn.nti.org/gsn/nw_20100420_6874.php

Nuke-Free Middle East Needed to Resolve Iran Dispute, Egypt Asserts

http://gsn.nti.org/gsn/nw_20100428_9811.php

Malaysia Pledges to Carry Out WMD Smuggling Penalties

http://gsn.nti.org/gsn/nw_20100415_4276.php

Malaysia Enacts Strict Penalties in Anti-WMD Law

http://gsn.nti.org/gsn/nw_20100406_6719.php

Controversial Indian law on nuclear liability spells disaster – activists

http://www.alertnet.org/db/an_art/55867/2010/03/14-111827-1.htm

Insuring India's Nuclear Power

http://online.wsj.com/article/SB10001424052748704508904575192793726876892.html?mod=WSJ_latestheadlines

8.6 Climate Change

Sources: (a more expanded list)

8.6.1 Scientific Evidence and Natural Disasters

Global Temperatures Last Month Broke Heat Records for March

<http://www.ens-newswire.com/ens/apr2010/2010-04-16-01.html>

CO₂ Emissions Causing Ocean Acidification to Progress at Unprecedented Rate

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12904>

Oceans' Saltiness Reaching Extremes

<http://news.discovery.com/earth/oceans-saltier-salinity-warming.html>

8.6.2 Food and Water Security

Arab states urged to be open on water scarcity

<http://www.alertnet.org/thenews/newsdesk/LDE6300FO.htm>

Countries Blame China, Not Nature, for Water Shortage

<http://www.nytimes.com/2010/04/02/world/asia/02drought.html?ref=world>

8.6.3 Health

World Health Day Website

<http://www.who.int/world-health-day/2010/en/index.html>

Commonwealth Secretary-General's Message

http://www.thecommonwealth.org/document/177370/222213/2010_world_health_day.htm

WHO Background Paper "Why urban health matters"

<http://www.who.int/world-health-day/2010/media/whd2010background.pdf>

Commonwealth Secretariat Discussion Paper "The state of the cities: why, and how, the Commonwealth must address the challenge of sustainable urbanization"

<http://www.thecommonwealth.org/files/222182/FileName/DiscussionPaper8.pdf>

8.6.4 Melting Glaciers

Scientists investigate Ecuador's receding glaciers

<http://news.bbc.co.uk/2/hi/americas/8629527.stm>

Scientists investigate Ecuador's receding glaciers

<http://news.bbc.co.uk/2/hi/americas/8629527.stm>

8.6.5 Migration

WFP Steps Up Response to Growing Food Crisis in Niger

<http://www.wfp.org/news/news-release/wfp-steps-response-growing-food-crisis-niger>

UN humanitarian chief in West Africa to focus on food crisis

<http://www.un.org/apps/news/story.asp?NewsID=34479&Cr=Holmes&Cr1=>

At Least 95 Are Killed as Floods Paralyze Rio

<http://www.nytimes.com/2010/04/07/world/americas/07brazil.html?ref=world>

Brazil begins recovery after Rio de Janeiro floods

<http://news.bbc.co.uk/2/hi/americas/8607518.stm>

Rio slum dwellers face forced eviction after landslides

<http://www.guardian.co.uk/world/2010/apr/11/rio-brazil-slum-forced-evictions>

8.6.6 Adaptation

African ministers adopt the extended Programme of Action

<http://www.unisdr.org/news/v.php?id=13655>

UN/ISDR Releases Report on Lessons Learned from Local DRR

<http://climate-l.org/2010/04/21/unisdr-releases-report-on-lessons-learned-from-local-drr/>

Economic Report on Africa 2010 calls for job creation to be a priority for African countries.

http://www.uneca.org/eca_resources/Press_Releases/2010_pressreleases/pressrelease2810.html

16th ASEAN Summit Website

http://asean2010.vn/asean_en/news/46

ASEAN Leaders' Statement: <http://www.aseansec.org/24515.htm>

8.6.7 Post-Copenhagen Negotiations

Climate change negotiators agree on intensified UNFCCC negotiating schedule for 2010

http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/101104_pr_awg_april.pdf

UNFCCC Parties Agree on Additional Meeting Sessions Before COP 16

<http://climate-l.org/2010/04/12/unfccc-parties-agree-on-additional-meeting-sessions-before-cop-16/>

US denies climate aid to countries opposing Copenhagen accord

<http://www.guardian.co.uk/environment/2010/apr/09/us-climate-aid>

8.8 Nanotechnology Safety Issues

More detailed descriptions of the nanotechnology issues

8.8.1 Health Canada Seeks Comments on Nanomaterials Definition

Health Canada has developed an interim policy statement that establishes a working definition for nanomaterials, in order to provide a basis for applying current legislation and regulations to nanotechnology products. They are seeking informal feedback from international stakeholders; comments will be accepted until 31 August 2010.

Military Implications:

Military personnel concerned with nanotech EHS should consider responding to this request (at the address below), in order to give Health Canada the benefit of their knowledge of the field.

Source:

Interim Policy Statement on Health Canada's Working Definition for Nanomaterials

<http://www.hc-sc.gc.ca/sr-sr/consult/2010/nanomater/index-eng.php>

8.8.2 First Sri Lankan Information Portal for Nanotechnology

The Sri Lanka Institute of Nanotechnology Pvt. Ltd (SLINTEC) has announced the launch of the first Sri Lankan information portal for nanotechnology, < www.susnanotec.lk >, an interactive site that will act as an information hub for nanotechnology research in Sri Lanka. According to the announcement, "The purpose of the website [is] creating awareness on nanotechnology amongst students, educate potential investors and clients on the research being done, enable the government to measure the performance of funding, provide a forum for scientists to share their thoughts, attract potential human resources, satisfy public curiosity and aid business sector decision makers in their planning and evaluation of nanotechnology."

Military Implications:

A military representative in Colombo should contact SLINTEC to establish liaison with this new enterprise, for the exchange of news, information, and ideas on nanotechnology, especially in the area of EHS and regulation.

Source:

Pyxle Develops Nano-Based Information Portal for Sri Lanka

<http://www.azonano.com/news.asp?newsID=16657>

8.8.3 Two New Reports on Nanotech EHS

Two presentations from the German FramingNano Workshop in March 2010 are available:

- Key regulatory developments in the field of nanotechnology (24 slides), Dr. Hans-Jürgen Klockner, German Chemical Industry Association (VCI)
(<http://www.framingnano.eu/images/stories/german-workshop/3.pdf>)
- Nanoscale Materials: a new challenge for toxicology (11 slides), Andreas Falk, BioNanoNet Forschungsgesellschaft mbH
(<http://www.framingnano.eu/images/stories/german-workshop/5.pdf>)

8.8.4 Conference on The Global Regulation Of Nanotech to Be Held

A Conference On The Global Regulation Of Nanotechnologies will be held at the Northeastern Univ. School of Law in Boston MA on May 7-8, 2010. The announcement states its objectives: "...determining what is the applicable law, domestically and internationally, exploring what the regulatory framework should be, [and] proposing governance models to achieve stakeholders' objective".

Military Implications:

Military personnel concerned with nanotech regulation should consider attending, if possible, or accessing the post-conference record at <<http://www.northeastern.edu/law> >

Source:

Global Regulation Of Nanotechnologies conference website

<http://www.northeastern.edu/law/academics/conferences/nano-conference/index.html>